Progress towards synthetic modelling of humic acid: peering into the physicochemical polymerization mechanism.

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Streszczenie

Oxidative copolymerization of gallic acid (GA) and protocatechuic acid (PA) at 1:1 ratio provides a water soluble humic-acid-like polycondensate (HALP) which mimics fundamental physicochemical and spectroscopic properties of natural humic acid (HA). The redox potential (E_h) of polymerization plays a determinative role on the physicochemical, spectroscopic and H-binding properties of the HALP as well as on the mass yield. Trends have been systematically mapped and analyzed for two E_h values, e.g. 0 mV (HALP_0) and 100 mV (HALP_100). HALP_100 has physicochemical properties, prevailing aliphatic structure, which resemble those of fulvic acids (FAs) or soil-type HAs. HALP_0 has a prevailing aromatic/phenol structure which resembles lignite-like HAs. Ionic strength had a significant impact on the charge and H-binding properties of the HALP_100. Donnan volume (V_D) estimates show that HALP_100 has a more expanded structure. A molecular model is suggested for the polymerization reactions in connection with the observed macromolecular, spectroscopic and H-binding characteristics of the HALPs and natural HAs.

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